Capillarity

- The interplay of the forces of cohesion and adhesion explains the phenomenon of capillarity. When a liquid is in contact with a solid, if the forces of adhesion between the molecules of the liquid and the solid are greater than the forces of cohesion among the liquid molecules themselves, the liquid molecules crowd towards the solid surface. The area of contact between the liquid and solid increases and the liquid thus wets the solid surface.

- The reverse phenomenon takes place when the force of cohesion is greater than the force of adhesion. These adhesion and cohesion properties result in the phenomenon of capillarity by which a liquid either rises or falls in a tube dipped into the liquid depending upon whether the force of adhesion is more than that of cohesion or not (Fig.2.4).

- The angle θ as shown in Fig. 2.4, is the area wetting contact angle made by the interface with the solid surface.

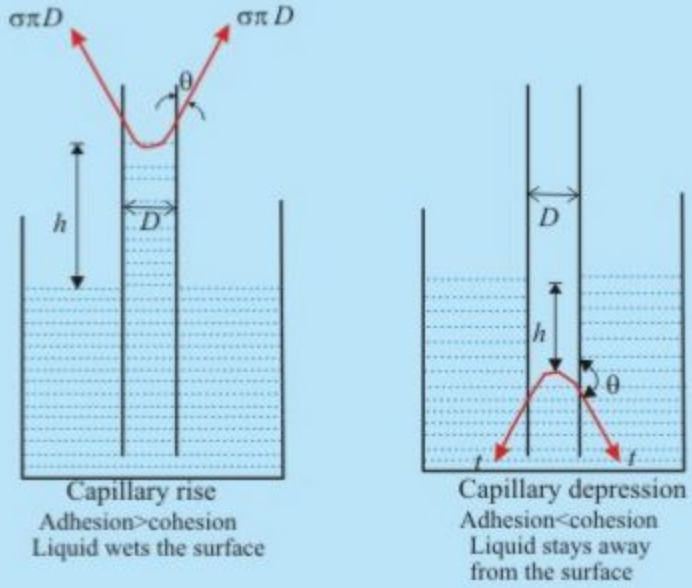

Fig 2.4 Phenomenon of Capillarity

- For pure water in contact with air in a clean glass tube, the capillary rise takes place with $\theta = 0$. Mercury causes capillary depression with an angle of contact of about 130^0 in a clean glass in contact with air. Since h varies inversely with D as found from Eq. ($h = \frac{4\sigma\cos\theta}{\rho g D}$), an appreciable capillary rise or depression is observed in tubes of small diameter only.